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ROWAN *VS* TORY: CONFLICTING VIEWS OF SCIENTIFIC RESEARCH IN CANADA, 1920-1935

Marianne Gosztonyi Ainley[1]

In 1908, the new University of Alberta opened its doors to thirty-seven students. It had no proper building and only four professors: of classics, English literature, modern languages and engineering, all of whom were chosen carefully by the university's president, Dr Henry Marshall Tory. The president was a mathematician by training. He was also an institution builder, 'a professional founder and first president' who, by the early years of the century had acquired a reputation as 'not the ordinary frock-coat type professor but rather the type of western rustler.'[2] Tory, the descendant of Scottish and United Empire Loyalist settlers, was born in 1864 in Guysboro, Nova Scotia. At the age of twenty-two, he entered McGill University to study mathematics. Graduating with an honors BSc in 1891, he became lecturer of mathematics at the same university, and after receiving his DSc in 1903, he was promoted to full professor. Two years later he became a founder of McGill College in British Columbia and in 1908 the first president of the University of Alberta. Towards the end of World War I, Tory became Executive Head of the Educational Services of the Canadian Overseas Forces, known as the Khaki University. From the early 1920s he was closely associated with the National Research Council of Canada (NRC). In 1924, while he was still president of the University of Alberta, Tory became the fifth chairman and first president of the NRC.

At about the time the new University of Alberta was ready to receive students, William Rowan, a seventeen-year-old British public school graduate, arrived on a Canadian Pacific train at Gleichen, a centre of the ranching district of southern Alberta. He was to work as a 'cow-puncher' and spend his free time photographing and sketching wildlife in the area as his hero, Ernest Thomson Seton, had done in Manitoba.

Rowan was born in Basel, Switzerland in 1891 of Irish and Danish parents. He received his early education in France and his initial training for the British Civil Service at Bedford School in England. This three years in the Canadian west reinforced his childhood interest in zoology

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1 Simone de Beauvoir Institute, Concordia University, Montreal, Quebec.

2 M.W. Thistle, *The Inner Ring. The Early History of the National Research Council of Canada* (Toronto, 1966), 206; M. Aytenfishu, 'The University of Alberta. Objectives, Structure and Role in the Community, 1908-1928' (Unpublished MA thesis, University of Alberta, 1981), 78.

and Rowan returned to England in late 1911 to study science at University College, London. There he enrolled in the honours zoology program with the equivalent of minors in botany and geology. His professors included the eminent embryologist James Peter Hill and the well-known botanist and ecologist Francis Wall Oliver. Rowan was soon producing fine work in Hill's zoology laboratories. At the same time, he was pursuing ecological investigations under Oliver's supervision at the University's Blakeney Point field station in Norfolk and participating in biometrical studies organised by applied mathematician Karl Pearson. His free time was devoted to ornithological fieldwork in Hertfordshire and studies of marine organisms off the coast of Wales. His early publications reflect the wide range of his interest and training.

Rowan's studies were interrupted by the war, but he managed to obtain the Honors BSc in Zoology in 1917. Two years of teaching high school biology in England convinced Rowan that he wanted to pursue science as a museum, university or government employee, preferably in Canada. He considered himself lucky when, in 1919, he was offered the post of lecturer of zoology at the University of Manitoba in Winnipeg.

While Rowan was actively searching for a Canadian position, Henry Marshall Tory embarked on a wide-ranging search for new faculty members for the expanding University of Alberta. His position was hardly unique. Other Canadian universities were also faced with overcrowded classrooms caused by a steady stream of returning veterans. All universities had to accommodate a growing student body. Obviously, the expanding student population needed more space and a larger teaching staff; new buildings were constructed at many universities, and new positions opened up for scholars in a wide variety of disciplines. Tory's search began hopefully, but he soon found that competent people were in great demand. Moreover, as McGill and other eastern Canadian universities offered very high salaries, they could attract the best European, American and Canadian scholars. The University of Alberta which was relatively new and badly underfunded, obviously could not compete with its well-established and better-funded sister institutions, but Tory 'refused to compromise his own standards, except for temporary appointments.'[3] His task was not easy. With an enrolment of 1106 students in 1919–20 – an increase of 79% over the previous academic year – the situation at the university was truly serious.[4] By the summer of 1920, Tory was desperately seeking competent scholars, mostly in Britain, for the coming academic year. His

3 W.H. Johns, *A History of the University of Alberta, 1908–1969* (Edmonton, 1981), 74.

4 Ibid., 75.

search for a zoologist who could build up a new department eventually led him to Rowan.

Tory heard of Rowan at University College, London where the young zoologist was well known for his early papers in *The Journal of Ecology*, *Biometrika* and *British Birds*. He eventually tracked Rowan down in Winnipeg, albeit with some difficulty. In a 1956 television interview, Rowan recollected that he first received a telegram from an unknown person about an available professorship in zoology, but he thought that it was a joke and threw away the telegram. When another wire arrived, this time from H.M. Tory, President of the University of Alberta, Rowan was advised to take it seriously. But he was on his way to the north to do fieldwork and did not bother to reply. The two eventually met in Winnipeg and Rowan, an excellent conversationalist and graduate of a prestigious university, convinced the exacting Tory to consider him for the position.[5] Although Tory conducted further inquiries regarding Rowan's suitability as lecturer of zoology, he must have been satisfied. He wrote to Rowan and offered him the post on probation. The starting salary was $2800 or $1200 more than the one Rowan received at the University of Manitoba. Should Rowan prove satisfactory, he would remain at the University of Alberta after 1921 to found a Department of Zoology.[6]

Tory had a strong interest in research, but this interest - like that of many North Americans - was highly utilitarian. Money for all but practical research was always scarce in Canada, and Canadian science was guided - or possibly cursed - 'by an entrepreneurial scientific ideology which lasted well into the 20th century.'[7] Moreover, the main institutions of scientific research, i.e. the government agencies, 'were dedicated almost entirely to practical science until after World War II.'[8] All scientific departments of the federal government had been established with practical aims in mind. The Geological Survey (1842), the Experimental Farms (1886) and the Biological Board (1909) pursued applied research to 'put science and industry together for the benefit of the people of Canada.'[9] Although some

5 CBC Profiles. Interview with Dr William Rowan, 27 August 1956. Kine #2372A.

6 Tory to Rowan, 20 July 1920, University of Alberta Archives, William Rowan Papers, Accession No. 69-16, [hereafter Rowan Papers].

7 T.H. Levere, 'What is Canadian About Science in Canadian History?' in R.A. Jarrell and N.R. Ball, eds., *Science, Technology and Canadian History* (Waterloo, 1980), 20.

8 'Preface,' in R.A. Jarrell and A.E. Roos, eds., *Critical Issues in the History of Canadian Science, Technology and Medicine* (Thornhill, 1983), xiv.

9 Thistle, *op. cit.*, 19.

members of the National Research Council actually recognized the fact that, up to the founding of the Council in 1916, university scientists in Canada who achieved distinction as research scientists did so 'in face of incredible difficulties and discouragements', pure research remained a secondary consideration for the NRC.[10] Canadian scientists interested in fundamental research continued to encounter discouragement, difficulty and indifference to their aims. This is hardly surprising since, in addition to the lack of government funding for pure research, Canada had no large pool of private capital willing to underwrite scientific research.

The NRC was established by the Canadian government in late 1916 as the Honorary Advisory Council for Scientific and Industrial Research. It began operating under the chairmanship of Dr A.B. Macallum, a research-oriented biochemist at the University of Toronto. The Council's mandate was to 'coordinate and promote scientific and industrial research' in Canada.[11] This was, in fact, badly needed. An initial survey conducted by the Council confirmed that there was very little industrial research in the country; it also revealed there were few adequately-trained research scientists. Studentships, fellowships and grants to assist research were speedily established by the NRC to remedy this situation.

Tory, like other Canadian promoters of industrial research, was convinced that other countries were rapidly 'going in for science, at a smart pace' and he spoke on this subject all over Canada.[12] Apparently, Tory 'tended to favour the practical short-term problems that would make a noise. Among the long-term projects, he favoured those with a staggering pay-off, preferably in tens of millions of dollars.' Tory preferred applied work and did not care for theoretical science. Moreover, as Mel Thistle writes, he 'made science look like a head-on race for utility.' This was perhaps necessary in Canada at the time as the 'public was unlikely to react to any other kind of appeal except the appeal to their own pockets.'[13] But Tory's approach to science, while in the tradition of Canadian government science, was in diametrical opposition to science as envisaged by most Canadian university scientists.

Rowan was a new type of scientist, unknown at the University of Alberta and elsewhere in Canada. Originally self trained in the best tradition of British natural historians, Rowan learnt precise, up-to-date laboratory methods in zoology at University College. Moreover, in Oliver's botany

10 Ibid., 54.

11 Ibid., 29.

12 Ibid., 130.

13 Ibid., 130–1.

and ecology classes and during field expeditions, he acquired an ecological awareness of the interrelationship of environmental factors and geology with a region's flora and fauna. Rowan had experience in using statistical methods, liked both experimental and field research and did not care for speculative theories. Instead, he searched for basic biological principles. Having lost several years because of his 'cow-punching' in Alberta and because of the war, Rowan, at age twenty-nine, was determined to make his mark in science. He was a short man who was energetic and enthusiastic and could work eighteen to twenty hours a day when motivated. He was an original thinker, excellent lecturer, a bit of a showman and a competent artist and musician.[14]

In Britain, Rowan's ecological work was on the rabbit, but he was interested in all animals: marine organisms, fish, amphibians, birds and mammals. By the time Rowan returned to Canada in 1919, his main scientific interest was birds. He soon discovered that the large area of western Canada provided a fine outdoor laboratory for ecological and ornithological studies. As it turned out, fieldwork was to provide facts which led to the initial hypothesis for his pioneering research.

Rowan arrived in Edmonton in September 1920 to lecture to huge classes of medical students at the university. The university was in its twelfth year and had a number of modern buildings in a very attractive location. But it had no scientific library and lacked most of the requisites for the teaching of zoology. There were no invertebrate and vertebrate study collections, no teaching charts, microscopes or even dissecting instruments needed for work in a zoology laboratory. Thus, much of Rowan's spare time had to be spent on making, borrowing and ordering such equipment. His Sundays and the odd free afternoon were spent in the field where he familiarised himself with the fauna of the Edmonton region.

These activities soon brought unwelcome repercussions because Tory had fixed ideas about zoological research. In fact, as far as he was concerned, all research had to be conducted inside laboratories. For him, fieldwork was no science, and ornithology was not part of zoology. A few weeks after Rowan's arrival, Tory warned him to give up both field activities and bird studies and stick to the laboratory and 'real' zoology. How Rowan was to collect animals for the study collection, some of which he was to use in exchange with museums or private collectors for specimens not found in Alberta, Tory did not specify.

14 There is considerable biographical information on Rowan in the Rowan Papers. Details of his life and career will be found in my forthcoming scientific biography.

Thus, within a month of Rowan's arrival, the long saga of Rowan *vs.* Tory had its first instalment. Tory, who at times 'seemed to think that his initials stood for "His Majesty" ... laid about him with a verbal weapon that made up in vigour what it may have lacked in finesse.'[15] He told Rowan to 'curb' his field activities and to 'lay off birds.' What prompted this first clash is not known. Rowan *did* carry out ornithological fieldwork locally and at nearby Beaverhills Lake as part of his depart- mental duties and was often accompanied by members of the small university community. These excursions were no doubt more 'visible' than Rowan's attempts to acquire specimens, other than birds, for the new zoology department's collection. Whatever the reasons, the first collision in October 1920 was the beginning of a long-standing feud between two volatile, determined people: the administrator, who had long ago left scientific work, and the new associate professor at the beginning of his career as teacher, scientist and innovative researcher. When Tory told Rowan to 'lay off birds,' Rowan, inwardly seething but outwardly meek, promised to cooperate.

Rowan complained to various friends about this turn of events. In a letter to Percy A. Taverner, zoologist at the Victoria Memorial Museum in Ottawa, as in others written to ornithologists during the same period, Rowan subconsciously echoed Tory's own bias when he wrote: 'I find that my enthusiasm for birds may lead me into trouble with the university authorities ... the reason is that they are afraid that they have got hold of an ornithologist and not a zoologist.'[16] The distinction here by Rowan between ornithology and zoology was a subconscious echo of Tory's own distinction but one that Rowan perpetuated in his own thinking for a number of years. It is true that in 1920 there were practically no laboratory studies of birds. Zoologists of the time concentrated on laboratory investigations of lower animals (invertebrates, fish and amphibians). The designation 'ornithologist' was applied chiefly to museum specialists and field workers investigating the taxonomy, morphology and life history-behaviour of birds. For Rowan, at the time ornithology meant fieldwork on birds. As he later combined fieldwork and laboratory investigations on bird biology, Rowan contributed to the transformation of ornithology from descriptive natural history to avian biology. Though Rowan still tried to please the president, his good intentions soon evaporated. He did not curb his field activities and, in fact, acquired birds as he did amphibians, mammals, hydras and insects at every possible opportunity. It was ironic that

15 Thistle, *op. cit.*, xiii.

16 Rowan to Taverner, 9 October 1920, National Museum of Natural Sciences (Ottawa), Vertebrate Zoology Division, the Percy A. Taverner Papers [hereafter Taverner Papers].

Rowan found himself in one of the ornithologically most promising and least 'worked' spots in Canada and yet was advised by the university administration and even some of his friends to ignore birds and concentrate on general zoological matters.[17] Rowan, however, could not ignore birds. He sketched, photographed and collected them. He studied their taxonomy, distribution, migration and behaviour. He also wrote papers which were later published in *Ecology* and *The Auk* on his ornithological observations in Manitoba and Alberta. It was at this period that Rowan, already a member of the British Ornithologists Union, became Associate Member of the American Ornithologists Union.

While Rowan seemed to settle down in his new position, Tory, obviously ambivalent about Rowan's suitability as a scientist, initiated 'discreet' inquiries and wrote to Sir Gregory Foster, Provost at University College, London. Tory informed Foster, who had known Rowan since 1911, that although Rowan had a good record, he 'made a specialty of Ornithology rather than pure zoology.' Tory did not refer to his earlier discussion with Rowan concerning fieldwork. He simply wrote to 'verify' with University College authorities whether or not Rowan had actually taken his honors BSc 'that I may be able to determine his ability to carry on the headship of the Zoology' department. It is obvious that Tory deplored the fact that Rowan's specialty was 'ornithology, rather than pure zoology.' But why did he wait until December to write to England? He had already found out that as a teacher Rowan was 'eminently satisfactory.'[18] Is it possible that Tory, whose own experience was in the physical sciences, was simply unsure about the qualities needed for the headship of the zoology department? And why did he neglect to mention that Rowan had, in the meantime, obtained an MSc? Whatever Tory's reasons, just how Rowan's undergraduate record was to prove or disprove his suitability for the post is unclear.[19]

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17 Lawrence to Rowan, 22 October 1920, Rowan Papers.

18 Tory to Foster, 6 December 1920. Copy in University of Alberta Archives, H.M. Tory, Personal Files and Lectures, 1304 [hereafter Tory Papers]. In fact, from Rowan's old professors at University College, London, Tory knew perfectly well that Rowan was interested in fieldwork. Tory also knew Sir Gregory Foster from the time of his own involvement in the Khaki University.

19 I could find nothing that would indicate Tory's awareness of trends and directions of zoological or larger biological research around 1920 in A.E. Corbett, *Henry Marshall Tory. Beloved Canadian* (Toronto, 1954), in the Tory papers (UAA) or in the various histories of the University of Alberta. Discussions with Maureen Aytenfishu also support my belief that Tory had no clear idea of the variety of research projects a university zoologist could do.

Foster replied that 'he is not a good examination man ... he has a good deal of leadership about him, but I do not think he will ever take high rank as a man of science. I agree that he will make a good teacher and will generally be an effective member of a staff.'[20] Foster's comments on Rowan's scientific potential indicate the unfortunate power administrators can have over the careers of scientists. Foster confirmed Tory's opinion of Rowan, which was already in direct contrast to those expressed by Rowan's old professors and previous employers. And the fact that university administrators can be wrong was borne out by Rowan's subsequent scientific fame which followed his pathbreaking experiments on bird migration.

There were two major reasons why Rowan's experiments caused a stir in the international scientific community, first because the phenomenon of migration had long interested scientists and second because he actually introduced experimentation into ornithology. This was an important innovation, as the experimental approach came to ornithology later than to other areas of zoology. In fact, according to Oskar Heinroth, ornithologists had 'an almost medieval horror of experiment.'[21] Although this statement is an exaggeration, it is true that well into the twentieth century, the formulation of testable hypotheses remained the domain of embryologists, physiologists and, later, geneticists. While ornithologists were slow to develop modern research programs, there were nevertheless some early experiments on birds. These included those on economic ornithology by Bernard Altum in Germany (1870s), on homing by J.B. Watson and K.G. Lashley in the USA (1907–13) and on nesting behaviour by Henry Mousley in Canada (1911–16). But these studies represented only a small part of ornithological work and, until Rowan's research at the University of Alberta, most ornithologists did not use manipulative procedures or conduct rigorous biological experiments.[22]

Migration had fascinated Rowan from his undergraduate days when at Blakeney Point he observed the large-scale northward and southward movements of shorebirds and waterfowl. Later, while he was teaching in Manitoba, he encountered the spectacular spring migration of passerine birds. After he moved to Alberta, Rowan found that migration information on Alberta birds was scarce and that the region was 'poorly repre-

20 Foster to Tory, 31 December 1920, Tory Papers.

21 Quoted by E. Stresemann in *Ornithology, From Aristotle to the Present* (Cambridge, 1975), 354.

22 M.G. Ainley, 'William Rowan and the Experimental Approach to Ornithology,' *Acta Congr. Int. Ornithol.* 19 (1988), 2737–45.

sented' in W.W. Cooke's major tome, *Report on Bird Migration in the Mississippi Valley in the Years 1884 and 1885* (Washington, 1888).[23] Determined to remedy this situation, particularly after he had discovered Beaverhills Lake was an excellent staging area sixty kilometres east of Edmonton, Rowan began to collect migration data. As it was obvious that he would have neither the time nor the opportunity to accumulate province-wide information on his own, Rowan instituted an Alberta migration scheme 'whereby migration records will be kept by competent ornithologists and sent in annually' to the university's zoology department 'to be filed and collated.'[24] At the same time, Rowan offered to contribute migration records to the US Bureau of Biological Survey which had already contained a 'quarter million cards [on North American bird migration] and had a bibliography of over 30,000 titles.'[25] Rowan, who was interested in all aspects of migration, wrote to Taverner: 'While I have to trace the movements of the birds here it is only a step towards the ascertaining of principles to be derived from facts.'[26]

But because of Tory's opposition, Rowan had to do fieldwork surreptitiously before or after work, on weekends and on holidays. Nevertheless, Rowan collected many facts on the periodic north-south flight of adult and juvenile birds, and within two years of his arrival in Alberta, he had formulated an hypothesis concerning the physiological basis of bird migration. Rowan may have remained content to continue collecting evidence and thinking about the various factors involved in migration until conditions improved at the University of Alberta, but a paper by the Rev G. Eifrig, 'Is photoperiodism a factor in migration?', published in the July 1924 issue of *The Auk* galvanised him into action.

Rowan had little access to the current scientific literature. He initially thought that he had come upon something original when, by a process of elimination, he decided that it was the length of day rather than temperature or barometric pressure – as was commonly thought – which initiated migration. In fact, daylight as such had already been considered by others

23 Lawrence to Rowan, 28 September 1920, Rowan Papers.

24 Rowan to Patton, 8 March 1922, Rowan Papers.

25 Nelson to Rowan, 3 April 1922, Rowan Papers.

26 Rowan to Taverner, 27 December 1922, Taverner Papers.

as an important factor in plant growth and migration.[27] Rowan was understandably upset to find that others had thought of this but was relieved that Eifrig and the British physiologist A.E. Schafer before him thought that there was no connection between migration and the actual conditions of the birds' gonads.

Rowan then decided to refute Eifrig's speculative theories and prove his own hypothesis experimentally. In an address given to the Royal Society of Canada in 1946, Rowan recalled that:

> In view of theories then current with reference to interstitial cells, sex hormones, and sex behaviour, one only had to suppose that the migratory journey was itself a particular phase of sexual behaviour, as much dependent on the development of the gonads, as the characteristic spring antics in which most birds indulge, to establish a practical working hypothesis for an experimental start. If one could artificially stimulate the gonads to spring activity in the fall, one might thereby induce the owners, when released to go north, instead of south in the autumn.[28]

But Rowan had considerable difficulty in gathering material for his initial hypothesis as he could do fieldwork only outside the official working hours. Moreover, because of Tory's attitude towards all work with birds, Rowan even had to carry out his experiments - which are still considered pathbreaking work in avian physiology - at home in his spare time.

In the fall of 1924, Rowan built two aviaries from used packing cases and mosquito netting and placed them at the far end of his garden. This way they were shielded from all sources of heat and also hidden from the eyes of the university president. Aviary A housed the experimental and Aviary B the control birds. The cages also contained food and water, and the experimental one was fitted with a light fixture. The control cage was lit only by natural light.[29]

Rowan then trapped dark-eyed juncos (*Junco hyemalis*) for the experiments. This species, a member of the sparrow family, winters in the southern United States and is one of the first spring migrants to reach Canada. The junco is an abundant migrant in Alberta, but because infor-

27 W.W. Garner and H.A. Allard, 'Effect of the Relative Length of Day and Night and Other Factors of the Environment on Growth and Reproduction in Plants,' *Journal of Agricultural Research* 18 (1920), 553-606 and E.A. Shafer, 'On the Incidence of Daylight as a Determining Factor in Bird Migration,' *Nature* 77 (1907), 159-63. Because of the inadequate holdings of the University of Alberta libraries at the time, Rowan was unaware of these publications.

28 William Rowan, 'Experiments in Bird Migration,' *Transactions of the Royal Society of Canada* 3rd Series, Section 5, 40 (1946), 123-4.

29 William Rowan, Junco notebooks, Rowan Papers.

mation was still scarce on its movements, Rowan began trapping birds too late and captured only one female along with dozens of male juncos. As some of the captured birds died or escaped, Rowan began his actual photoperiodism experiments on one dozen juncos and several white-throated sparrows (*Zonotrichia albicollis*) on 1 October 1924. From the first day, experimental birds received daily increments of five additional minutes of artificial light after sunset. First Rowan used a 75-watt blue bulb but soon changed it for a 60-watt frosted white one. Eventually he decided to use two 50-watt white frosted bulbs. As of 1925, this was increased to three 50-watt bulbs.[30]

Every two weeks Rowan killed experimental and occasionally also control birds and fixed their gonads for later histological study. His investigations proved that in birds that received the additional amount of light in the fall, the size of the gonads decreased for the first few weeks. But after the middle of November, they began to increase and grew until the end of December when they were larger than the gonads of the first spring migrants to reach Edmonton. Rowan, convinced that he was on the right track, wrote in a jubilant mood:

> I have succeeded in experimentally inducing juncos to develop spring fever at Christmas in large aviaries in the garden with the temperatures running down to 52 below zero. They were singing all day long and all that sort of thing and on dissection proved to have large spring testicles. ... I kept only the female till the end, when she had well developed ovaries in about the same conditions as they have them normally in the spring.[31]

Rowan described the gist of his experiments in 'Relation of Light to Bird Migration and Developmental Changes,' published in the British journal *Nature* in April 1925. In this short paper, Rowan stressed that 'it would ... appear that whatever effect daily increases of illumination may or may not have on migration, they *are* conducive to developmental changes in the sexual organs.'[32] The paper carried his home instead of his institutional address. In a letter to the British embryologist J.P. Hill, his old professor at University College, Rowan explained that this was 'in deference to the prejudices of President Tory whose veto of all work in which birds are involved still holds. You will note that all the dates of releases, etcetera are either Sundays or holidays of other sorts so that I am not be held to have wasted university time.'[33] While Rowan conducted the actual experimental

30 Ibid.

31 Rowan to Taverner, 5 January 1925, Taverner Papers.

32 *Nature* 115 (4 April 1925), 495.

33 Rowan to Hill, 19 June 1926, Rowan Papers.

work in his outdoor garden laboratory, he did all histological work on the gonads in the university's zoological laboratory. It seems that as long as Rowan was in the laboratory, Tory did not care what he did there, but, as we shall see, he was still opposed to all fieldwork.

The immediate enthusiastic response to his work persuaded Rowan that he should carry out further experiments but on a much larger scale. For these he needed funds. Packing cases and mosquito netting were not sufficient for constructing larger aviaries, and he needed money for supplies connected with his work. No funds were available at the university, but at least he could depend on the intellectual support of his colleagues, the biochemist J.B. Collip and members of the physics department. One of his new correspondents, Julian Huxley, recommended that Rowan apply to the Royal Society of London for a grant. He was successful, as he was to be with applications to all the foreign agencies. In 1926, he received 32 from the Royal Society; the following year he obtained 45; and in 1932 35. The Bache Fund of The Johns Hopkins University provided $500 in 1928, the Elizabeth Thompson Fund of Harvard University supplied him with $400 in 1929 and again in 1931, and the US National Research Council granted him $1000 in 1931.[34] He received nothing, however, from the National Research Council of Canada.

With the aid of the British and American grants, Rowan was able to expand his experiment on juncos between 1926 and 1928, and from 1929 he conducted experiments on the American crow (*Corvus brachyrhynchos*). This large conspicuous bird is still heartily disliked by farmers who shoot crows at every opportunity. This fact, combined with the one that the Migratory Bird Convention Act of 1917 did not protect crows, made this bird an ideal species for Rowan's further experiments.

Rowan again exposed experimental birds to daily increments of additional light and managed to induce reversed migration. That is, he induced spring migratory readiness in crows in late autumn, then had their tails painted a conspicuous yellow, transported them by a small plane to a distance of more than 160 kilometres from Edmonton and released them. Though many of the treated birds disappeared in the northern muskeg, never to be found, there was sufficient evidence - 58% of all released birds

34 Rowan Papers.

were recovered - to prove that experimental crows released in autumn migrated to the north instead of to the south. Rowan published a number of prestigious papers on his research, and the information obtained from the first three years of his experiments formed the basis of his DSc thesis at University College, London.[35]

During the period Rowan conducted experimental work on bird migration, he also pursued wide-ranging investigations concerning the cyclic fluctuations of game birds, rabbits and other species of animals of the north temperate zone. But he was always badly in need of research funds. He worked without a secretary and until the late 1930s even without a graduate student to provide assistance. Thus, despite the obvious theoretical and economic importance of his investigations, Rowan's cyclic research progressed slowly. Rowan planned to use the integrative approach in his research on biological cycles, and in 1929 he proposed an intensive multidisciplinary study of the ten-year cycle in the Edmonton district. He attempted to organize and involve various departments of the university for this cooperative project: Botany to investigate tree-rings; Bio-chemistry to do a series of experiments to get an idea of the connection between ultraviolet light and the animal concerned; Pathology to investigate diseases in fluctuating animal populations; and Physics to record ultraviolet radiation for at least ten years. But, because of lack of funds, this well-thought-out multidisciplinary study did not materialize.

Rowan's research, beginning with a small bird in 1924, created great interest in the scientific community. His innovative approach in studying the physiological basis of migration stimulated much experimental work in Europe and North America. During the following two decades, investigations into the effects of daylight on the reproductive cycle of animals were extended by Rowan and others to include more than fifty species of animals of all classes of vertebrates.[36]

Why then, in spite of his success in obtaining foreign grants and the favourable response of the international scientific community, was Rowan

35 William Rowan, 'On Photoperiodism, Reproductive Periodicity, and the Annual Migration of Birds and Certain Fishes,' *Proceedings of the Boston Society of Natural History* 38 (1926), 147–89; 'Experiments in Bird Migration. I. Manipulation of the Reproductive Cycle: Seasonal Histological Changes in the Gonads,' ibid. 39 (1929), 151–208; 'Experiments in Bird Migration. II. Reversed Migration,' *Proceedings of the National Academy of Sciences* 16 (1930), 520–25; and 'Experiments in Bird Migration. III. The Effect of Artificial Light, Castration and Certain Extracts on the Autumn Movements of the American Crow (*Corvus brachyrhynchos*),' ibid. 18 (1932), 639–54.

36 M.G. Ainley, 'William Rowan and the Experimental Approach to Ornithology,' *Acta Congr. Int. Ornithol.* 19 (1988), 2737–45.

unable to secure research money in Canada? And why was he unable to move from the University of Alberta to some other Canadian university? In fact, in the early 1930s, he did apply to both Queen's and McGill universities. In both cases, men less suitable than Rowan were appointed to the post of zoologist. While there could have been several reasons, such as the fact that Queen's University was looking for a young scientist 'who will be glad to come at a comparatively small salary,' I believe that the main reason for Rowan's lack of success was his relationship with Tory.[37]

In 1928, H.M. Tory left the University of Alberta to become full-time president of the National Research Council of Canada. Although Tory later maintained that in the mid-1920s he had 'lost interest in Rowan,' there is evidence that this was not so.[38] Rowan just could not be ignored. He was a conspicuous member of the Edmonton scientific and cultural community. He was an excellent teacher, an outspoken member - and later president - of the University Scientific Association, a fine musician and a respected artist.

Tory could be kind and forgiving, at least according to his biographer, but he obviously continued to harbour resentment against Rowan; and he had long tentacles. In fact, Tory was detrimental to Rowan's career and even his health in a number of ways. As president of the NRC, Tory was in an excellent position in 1930 to prevent Rowan's funding by the Council. He could also prevent Rowan's career advancement.

In 1930, Rowan applied to the NRC, requesting funds for his large-scale crow experiments. In his application, Rowan stressed the theoretical importance of his research, previously funded by British and American agencies. He emphasized that as a result of his original experiments, various universities on this continent and in Europe were 'actively repeating the experiments [and the work] which was entirely conceived and started in Canada, and which has already been productive of various

37 McClement to Rowan, 28 June 1932; McGill University hired 'a man named Fantham' from South Africa. Tait to Rowan, 20 December 1932, Rowan Papers.

38 Tory to Currie, 11 January 1932, National Research Council Archives, H.M. Tory, Miscellaneous Papers, file 'C'.

results entirely new to science, should be continued in the Dominion.' The application also stressed that the experiments were to be carried out in the zoological laboratory of the University of Alberta which, he added no doubt for Tory's benefit, 'is adequately equipped for all the usual type of zoological research work.'[39] Rowan asked for only $905; he received nothing. Because the notification arrived too late for Rowan to apply elsewhere for funds, he was unable to do research that year. The NRC kept no records of the discussions, but the minutes of the Standing Committee on Assisted Research of which Tory was a member stated that the Committee 'agreed to recommend that his application be not granted.'[40] Reasons for the refusal were not given.

The following year, while Rowan engaged in large-scale experiments with American funds, he learnt of the prospect of a position as zoologist at McGill. Rowan made a quick visit to Montreal during the Christmas recess to talk to various scientists who could support his application for the post. Among these were the biochemist J.B. Collip and anatomy professor John Tait. British scientists Julian Huxley, F.A.E. Crew and E.W. MacBride wrote letters of recommendation on his behalf.

In early 1932, Tory received a confidential letter from Sir Arthur Currie, principal of McGill. The letter dealt with scientists applying for various posts at the university, one of whom was William Rowan. Tory admitted in his reply that what he had to write about Rowan would 'not be of any great help to him in securing the appointment at McGill.' He then proceeded to misrepresent Rowan's academic achievements. He wrote, for example, that Rowan 'got a BSc degree from the University of London ... on a semi-war degree basis.'[41] This was patently untrue. Rowan began his studies in 1911, enlisted in the London Scottish Rifle Volunteers in September 1914 and, after being invalided out because of heart trouble, returned to the university to finish his degree.[42]

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39 Rowan, application to the National Research Council, in *Proceedings of the Eighty-fourth Meeting of the Council, 1930*, 35.

40 Ibid., 36. In 1930, Professor O.S. Gibbs from Dalhousie University applied for a $500 grant to investigate 'uric acid secretion of the bird.' It was also 'recommended that this application be not granted.' Ibid., 127. Tory, as president of the NRC sat *ex officio* on a number of committees on assisted research. A perusal of the list of grantees and topics funded (see various appendices)in the NRC *Annual Reports* easily prove, however, that despite the avowed utilitarian orientation of the NRC, topics of fundamental importance, particularly in physics, were funded. Research on birds did not receive funding.

41 Tory to Currie, cited in note 38.

42 Rowan, Discharge Certificate (1915), Rowan Papers. Also, departmental records at University College London Archives.

Tory also told Currie that he had not been impressed with Rowan as a scientist because Rowan 'would not stick to the laboratory but went out ... on his various bird missions.' Tory admitted that:

> After a year or two I had a full discussion of the situation with him. I told him his only hope of becoming a competent zoologist and of proving his right to the headship of the department ... would be by taking up some special line of work and sticking to it until he had proved his position as zoologist. This he agreed to do. Then to my surprise I found that he had made an arrangement with Harvard University to go to northern Alberta and shoot wood buffalo, and I had to tell him frankly if that was the work he intended to follow he might dismiss from his head any idea of becoming head of a department in any university over which I preside. He stated in reply that he preferred to follow his bent and take second place, and there the matter stood. He went on with his bird work ... took up some work with the University of London and on the basis of his bird studies received his doctor's degree. [He added] When I left Alberta Rowan was an associate professor with the distinct understanding that so far as I was concerned he had reached his limit.[43]

Tory admitted, however, that during his last few years in Alberta, he 'gave little attention to Rowan, due to the fact that only elementary work was being done in the department and I know that was being done well.'[44] He obviously ignored the reactions of the international scientific community to Rowan's pioneering experiments and continued to regard Rowan as a useless scientist. Tory told Currie, 'I would not consider him at all capable of ever organizing [a substantial department of zoology where research and graduate studies will be pursued with diligence] or of drawing to it men who would be zealous for work.'[45]

Tory probably lost interest in Rowan because the scientist was one of the few people who had ever stood up to him. In the early 1920s, Rowan defied Tory several times when the president of the university attempted to restrict his scientific work. This work included ornithology and *all* fieldwork, especially expeditions that took Rowan away from the campus. The conflict came to a head in 1925 when Rowan, incensed by the

43 Tory to Currie, cited in note 38.

44 Ibid.

45 Ibid.

Canadian government's attempt to mix herds of wood and plains buffalo at Wood Buffalo Park, acquired a provincial government permit to collect two specimens of the threatened wood buffalo. Partially financed by the Museum of Comparative Zoology who were anxious to acquire two buffalo skeletons for their collection, Rowan and a few companions went to Wood Buffalo Park to do comparative studies of the two species of mammals. Although the trip took place before the start of the academic year, Tory objected to Rowan's absence in the field. He later attempted to prevent Rowan from going to nearby Wainwright Park to complete his studies on the plains buffalo.[46]

The president was obviously not used to underlings opposing him. Mel Thistle, author of the *Inner Ring*, remarked that 'with hindsight, it is a pleasure to note that Rowan politely but firmly defied the educational master figure of his age and proceeded to prove ... that in [the matter of bird studies and field work] the grand old man [Tory] had been hopelessly wrong-headed.'[47]

William Rowan became one of the best known Canadian zoologists of the century, despite the opinions of administrators like Foster and Tory. His migration research, referred to as pioneering or pathbreaking, has been included in most zoology textbooks to date. He became a Fellow of the Royal Society of Canada in 1934 and recipient of its Flavelle Medal in 1946. His work was emulated all over the world by T.H. Bissonnette, Emil Witschi, S.C. Kendeigh and Albert Wolfson in the United States; by Jacques Benoit in France; and by scientists in Japan, Holland, Britain and elsewhere.[48] Moreover, Rowan can be considered the intellectual founder of photobiology, now a thriving research area with journals, societies and annual meetings.[49]

Rowan *did* become full professor after Tory left the University of Alberta. His attempts to change positions and work at another university in

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46 Rowan Correspondence. Rowan was far from alone in his opposition of mixing the Wood and Plains Bison. British, American and Canadian zoologists and various scientific associations protested the move. Moreover, the Plains Buffalo, held at the Wainwright Buffalo Park, Alberta, was contaminated with tuberculosis, and scientists were worried about the detrimental effects of the disease on the other animals. See Appendix J, 'Buffalo and Disease,' in Frank G. Roe, *The North American Buffalo. A Critical Study of the Species in its Wild State* (Toronto, 1951), 829–41.

47 Thistle, *op. cit.*, 409.

48 William Rowan, 'The Effect of Controlled Illumination on the Reproductive Activities of Birds,' *Hauptberichte, 6. Weltgeflugel-kongress 1936*, 142–52; Rowan, 'Light and Seasonal Reproduction in Animals,' *Biological Reviews of the Cambridge Philosophical Society* 13 (1938), 374–402.

49 Interview with Jean Lauber, University of Alberta, 1985; Roy Anderson, University of Guelph, 1986.

Canada were unsuccessful, however. Tory remained president of the National Research Council until 1934. He had powerful friends among university administrators, and he could and did hamper Rowan's career advancement.

There are several important problems of a general nature that the Rowan versus Tory story brings to our attention: the often-overlooked impact of personal relationships on the careers of scientists; the detrimental effects of opposing views of science, particularly utilitarian versus pure science by administrators and scientists; the problems of funding in Canadian science; and the dangers of imposing the methodology of the physical sciences and the views of physical scientists onto research in the biological sciences. At this point, let us not forget that Tory derived his ideas of scientific research from his own exposure to research in the Cavendish Laboratory at Cambridge. He was sent there in 1893 by McGill to learn how a physics laboratory functions so that he could set one up at the university.[50]

Rowan's career advancement and ultimately his scientific productivity were hampered by Tory's attitude and subsequent animosity because, as an administrator in a position of power, Tory could and *did* prevent Rowan from carrying out his experiments during working hours; therefore, research proceeded at a pace slower than was necessary by the nature of the work. Moreover, Tory, because of his power and connections, could also prevent Rowan from being considered for the Chair of Zoology at McGill University.

Tory's attitude towards research also affected other scientists at the University of Alberta and elsewhere in Canada. Because of the power Tory wielded, a number of scientists were refused important grants. The full impact of Tory's fixed ideas on the development of Canadian science is not yet known, and it awaits further study. We do know, however, that some scientists managed to escape his clutches to have successful careers. A good example is J.B. Collip of insulin fame. This eminent biochemist also suffered at the University of Alberta under Tory, but because of his Canadian training and the existence of a mentor, A.B. Macallum, he was able to move to McGill and later to the University of Western Ontario.[51] In contrast to Collip, Rowan was trained in England and had no Canadian mentor in a position of power. He had eminent supporters for grants, however, like J.S. Huxley, Charles Elton, F.A.E. Crew, Joseph Grinnell and others. Although he did secure research grants from abroad, for

50 Corbett, *op. cit.*, 44–6.

51 M.L. Barr and R.J. Rossiter, 'James Bertram Collip, 1892–1965,' *Biographical Memoirs of Fellows of the Royal Society* (1966), 235–67.

most of his scientific career Rowan had to face fatigue, general financial problems and onerous teaching and administrative duties. Because of these, his health was impaired and his scientific productivity diminished.

After Rowan's death in 1957, Julian Huxley told Dr Albert Hochbaum, Director of the Delta Waterfowl Research Station in Manitoba, that Rowan was one of the best experimental zoologists of the 20th century. 'But why,' he asked Hochbaum, 'with all his talents, did the fool have to bury himself in Alberta?'[52]

I hope that my forthcoming biography of Rowan will answer this and other questions about the life and work of this outstanding scientist. There is a great need in Canada, as elsewhere, for finely detailed studies of the careers of scientists. Only these can illuminate all the factors - personal, social, economic, administrative and intellectual - that advanced or retarded the development of science. Through scientific biographies we can begin to understand the human, intellectual and social elements that are part and parcel of our studies in the history of science.

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52 Interview with H.A. Hochbaum, 1985.